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| 氏 名 | CHUANUWATANAKUL Suchada |
| 授与した学位 | 博 士 |
| 専攻分野の名称 | 理 学 |
| 学位授与番号 | 博乙第4240号 |
| 学位授与の日付 | 平成20年 3月25日 |
| 学位授与の要件 | 博士の学位論文提出者 (学位規則第5条第2項該当) |
| 学位論文の題目 | Studies on Novel Flow-Based Electrochemical Methods for Trace and Ultratrace Analysis of Some Harmful Substances (有害物質の微量・極微量分析のための新規流れ電気化学分析法に関する研究) |
| 論文審査委員 | 教授 本水 昌二 教授 山本 峻三 准教授 大島 光子 |

学位論文内容の要旨

This work describes the development of novel flow-based electrochemical methods and their application to the determination of some harmful substances: antibiotics, antibacterial agents, and heavy metals.

First, a flow injection-amperometric method was developed for the determination of lincomycin and chloramphenicol antibiotics using the boron-doped diamond (BDD) electrode. The optimum detection potential and analytical characteristics were studied. The developed methods were also applied for the determination of antibiotics in some pharmaceutical preparations and milk samples.

Second, a high-performance liquid chromatographic method with amperometric detection using the BDD electrode was developed for the determination of four sulfonamides (SAs): sulfadiazine, SDZ; sulfamethazine, SMZ; sulfamonomethoxine, SMM; and sulfadimethoxine, SDM. A C4 column was used for the separation of four SAs. An amperometric detection potential was optimized and the analytical characteristics were studied. The developed method was applied for the determination of SAs in egg samples with satisfactory results.

Third, a sequential injection – square-wave anodic stripping voltammetric (SIA-SWASV) method was developed for the simultaneous determination of heavy metal ions, Pb(II), Cd(II) and Zn(II) employing *in situ* plated bismuth-film screen-printed electrode (Bi-SPCE) as a working electrode. The experimental conditions were optimized and the analytical characteristics of the developed methods were studied. The proposed method was applied to the determination of Pb(II), Cd(II) and Zn(II) in water samples with satisfactory results.

Finally, an automated sample pretreatment and anodic stripping voltammetric determination system (Auto-Pret ASV system) was developed for the simultaneous determination of Pb(II), Cd(II) and Zn(II) by SWASV using Bi-SPCE. The optimum conditions and the analytical characteristics were studied. The method was successfully applied to the simultaneous determination of Pb(II), Cd(II) and Zn(II) in water sample.

論文審査結果の要旨

The study focuses on the development of novel flow-based electrochemical methods and their application to the determination of some harmful substances: antibiotics, antibacterial agents, and heavy metals.

First, a flow injection-amperometric methods were developed for the determination of lincomycin and chloramphenicol antibiotics using the boron-doped diamond (BDD) electrode. The optimum detection potential and the analytical characteristics were studied. The developed methods were successfully applied to the determination of antibiotics in some pharmaceutical preparations and milk samples.

Second, a high-performance liquid chromatographic method with amperometric detection using the BDD electrode was developed for the determination of four sulfonamides (SAs): sulfadiazine, sulfamethazine, sulfamonomethoxine, and sulfadimethoxine. A C4 column was used for the separation of SAs. An amperometric detection potential were optimized and the analytical characteristics were studied. The developed method was applied to the determination of SAs in egg samples with satisfactory results.

Third, a sequential injection–square-wave anodic stripping voltammetric method was developed for the simultaneous determination of heavy metal ions, Pb(II), Cd(II) and Zn(II) using *in situ* plated bismuth-film screen-printed electrode (Bi-SPCE) as a working electrode. The experimental conditions were optimized and the analytical characteristics of the developed methods were studied. The proposed method was successfully applied to the determination of Pb(II), Cd(II) and Zn(II) in water sample.

Finally, an automated sample pretreatment and anodic stripping voltammetric determination system (Auto-Pret ASV system) was developed for the simultaneous determination of Pb(II), Cd(II) and Zn(II) by ASV using Bi-SPCE. The optimum conditions and the analytical characteristics were studied. The method was successfully applied to the simultaneous determination of Pb(II), Cd(II) and Zn(II) in water sample.

In conclusion, the thesis submitted is worth to be admitted as a doctoral thesis.